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Vegetable & Fruit Headline News

The University of Maryland Extension Agriculture and Natural Resources Profitability Impact Team proudly presents this bi-weekly publication for the commercial vegetable and fruit industry.

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Spring Observations from WyeREC

By Michael Newell
Horticultural Crop Program Manager

High Tunnel Strawberry Production:

With the recent unusually warm temperatures, harvest has begun in the high tunnels here at WyeREC. There was a noticeable amount of deformed berries with the first harvest. This is not all that unusual with the first harvest. Low temperatures during late flower bud formation and decreased pollinator activity at the start of bloom are the usual causes. At times, we can see the same results with the outdoor production systems.

Proper ventilation to reduce the humidity levels in the tunnels is very important to reduce the incidence of gray mold. Two sprays during bloom are the only fungicide sprays we intend to use in the tunnels.

Field Strawberry Production:

The annual plasticulture Chandler plots are at 50% bloom. It is extremely important to keep an eye on the weather forecast for any chances of frost/freeze events. Sprinkler irrigation and a frost alarm are the most efficient means of providing protection. Pulling floating row covers on and off gets old real fast but they still have their place in the annual production system. Leaving the floating covers on for extended periods (raining, too windy to remove) during bloom can reduce pollinator activity and increase humidity levels which will increase gray mold development.

Recent warm periods also increased the possibility of blossom blast (damage to the flower). This can occur if blossom temperatures reach into the 90F and above range. The only method of monitoring blossom temperature is to use thermal-coupled sensors inserted directly into the blossoms and monitor with a hand-help digital read-out device. Intermittent sprinkler irrigation during the hottest part of the day to allow for evaporative cooling is very effective in reducing blossom temperatures. If sprinkler irrigation is not an option, keeping the plants well hydrated to increase plant transpiration, with drip applied water can help limit blossom damage.

Leaf petiole sampling for nutrient analysis is really the only way to know the nutrient status of the plant. Sufficiency ranges are for petioles taken from the most recently matured trifoliate leaf are:

Nitrogen.....3.0-4.0%	**Calcium.....0.5-1.5%**
Iron.....50,300 ppm	**Copper.....3-15ppm**
Phosphorous.... 0.2-0.4%	**Magnesium...0.25-0.45%**
Manganese.....300ppm	**Boron.....25-50ppm**
Potassium.....1.1-2.5%	**Sulfur.....0.15-0.40%**
Zinc.....15-60ppm	

Nitrogen and Potassium are the two main elements we are most concerned with during the spring followed by Calcium and Boron. In general we are looking for 3000-4000 ppm of nitrogen as we begin fruit harvest and gradually decline to about 500ppm at the completion of harvest. Nitrogen petiole levels in excess of 10,000 ppm can depress yields and quality. There is increasing evidence from NC State that potassium is very important for highly flavored berries. Appling potassium through the drip as potassium nitrate or potassium sulfate are two options. At the very least, we would like to apply nitrogen and potassium as a 1:1 ratio, although some research suggest that a 1:2 ratio is even better. For many growers (and here at WyeREC) combinations of 30% liquid N, potassium nitrate and calcium nitrate are used to meet the plants needs.

Tree Fruit Production:

Our earliest blooming Asian pears were in full bloom the week of April 6th. According to the "Maryblyt" program for predicting potential Fire Blight infection periods, we had an infection April 8/9. We applied our bactericide prior to the rain event on April 8th.

Newscast NBC Channel 17: *Strawberry Blossom Protection With Farmer Mitchell Wrenn & Dr. Barclay Poling, NC State at:*

http://wake.mync.com/site/wake/news/story/50394/strawberry-season-almost-here

By Kerry Hall, NBC17, 4 days, 18 hours ago
updated: Apr. 9 4:37 pm

Two Maryland Vegetable/Fruit Growers Named to Agriculture Secretary's Advisory Committee

Jerry Brust, UME IPM Vegetable Specialist

Tom Vilsack, United States Agriculture Secretary announced the names of members of the new Fruit and Vegetable Industry Advisory Committee. Two Maryland growers have been selected as members of this committee. Guy Moore from Larriland Farms who also is the President of the Maryland Vegetable Growers Association and grows vegetables and fruit at his farm's U-Pick operation is one member. The other member is J. Allen Swann of Swann Farms, who is a board member of the Maryland Vegetable Growers Association and also grows both fruit and vegetables. There were 25 members from across the United States selected from a list nominated by their peers. This committee represents fresh fruit and vegetable growers, shippers, wholesalers, retailers, importers, fruit and vegetable processors, fresh-cut processors and departments of state agriculture. Each member is appointed to a two-year term. This committee will advise the Secretary of Agriculture on issues affecting the fruit and vegetable industry.

We would like to say congratulations to Guy and Allen on being selected to represent vegetable and fruit growers of Maryland and the mid-Atlantic. Some states had no representation on this board, i.e., Michigan and Pennsylvania, even though they have a great deal of fruit and vegetable production. I think this shows the recognition our growers have in the fruit and vegetable industry. If you are concerned with the future of vegetable growing in the U.S. voice your concerns with either of the two committee members. Another way you can do this is by joining the MVGA. You can go to http://extension.umd.edu/agriculture/veggrowers/index.cfm and download a membership application or you can call Jerry Brust at 301-627-8440 and I can take your application over the phone.

Rynaxypyr Label Expansion

Jerry Brust, UME IPM Vegetable Specialist

DuPont's rynaxypyr, or Coragen, label has been expanded to include sweet and seed corn as well as snap bean and strawberry as well as many other fruiting vegetables. Coragen does a good job of controlling Lepidopteran pests such as corn earworm, beet armyworm, fall armyworm, etc in many different crops. Coragen can be applied as a foliar spray or through drench or drip irrigation. In tomato and pepper trials over the last several years it has given excellent control of several worm species by applying one or two applications through the drip line. Usually one drip application will give very good control of European corn borer in peppers.

Expansion of labels often times come about because of a Federal program called IR-4. Because of the costs incurred by a company to put a crop on a label, oftentimes only the larger crop uses (such as corn or cotton) of the chemical are labeled by the company. IR-4 works with the chemical company and the EPA to supply research data to support new EPA tolerances and labeled product uses for reduced risk products on vegetables and fruit. There is a local IR-4 research/testing farm in Maryland located at the Lower Eastern Shore Research and Education Center in Salisbury, MD. This program is run by Marylee Ross and has developed data for many products registered on vegetables over the last 15 years.

Late Blight for 2010

Jerry Brust and Karen Rane, Director of the University of Maryland's Plant Diagnostic Clinic

As everyone knows, we had an unusual outbreak of late blight in tomato and potato last year in the mid-Atlantic and the Eastern U.S. This was due to two factors: unusually cool and wet weather in May and June (ideal conditions for late blight to flourish), and the unintentional introduction of the disease on infected tomato transplants sold through numerous retail outlets in the region. Late blight is caused by the fungus-like pathogen *Phytophthora infestans.* The pathogen causes severe blighting of the leaves and stems of tomato and potato plants. Tomato fruit can also be infected, resulting in brown discoloration and eventual decay. Potato tubers can become infected when sporangia are washed from lesions on stems and foliage into the soil.

Underside of tomato leaf showing sporulation (white fuzzy growth) of late blight pathogen

What to do now:

Potatoes: If you had late blight symptoms in your field or garden, do not save tubers as seed to be planted next spring. Purchase certified disease-free potato seed from a trustworthy source. Consider planting varieties with some resistance to late blight, such as 'Allegany', 'Elba' or 'Kennebec'. Inspect last year's potato plot and any compost or cull piles for volunteer potato plants that might come up. If you find potato plants, pull them out and destroy them.

Tomatoes: If possible select disease-resistant varieties for some of your crop. There are three cultivars: 'Mountain Magic', 'Plum Regal', and 'Legend' reported to have some resistance to late blight. Growing your own transplants or purchasing from a reliable source will assure a good start to the season. Inspect all transplants for any cankers or leaf blight before planting. Keep a close watch for late blight symptoms on your tomatoes and potatoes as they grow, especially if the weather is cool and wet, so that you can take action quickly if the disease occurs again. For commercial growers, applying preventative fungicides for late blight as part of a disease management program will help reduce losses if we see another significant late blight outbreak this coming season. Remember late blight does not overwinter on tomato or in soil in Maryland and that includes tomato stakes, string, plastic, etc.

INSECT CONTROL IN SWEET CORN

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Effective control of ear-invading insects is essential to meet the demands for quality sweet corn. In the Mid-Atlantic States, European corn borer and corn earworm are the primary ear invaders, followed by sap beetles and fall armyworm as occasional pests. Infestations vary by year, time of season, and location. If not controlled, these insects can typically cause 10 to 25% ear damage in early season plantings, and greater than 50% ear damage in late plantings. Sweet corn growers rely heavily on broad-spectrum insecticides to control ear-invading insect pests. Typically, 1 to 3 sprays per processing crop or 2 to 8 sprays per fresh market crop are applied during silking. Corn borer and fall armyworm also infest whorl and tassel stages requiring additional sprays prior to silking.

Pyrethroids have been the most widely used class of insecticides on sweet corn. However, their effectiveness against corn earworm has declined during the past decade due to resistance development. Resistance monitoring has documented increasing levels of corn earworm resistance to pyrethroids in southern and north central United States. There have also been numerous reports of reduced field efficacy and control failures. Pooled from data on insecticide trials conducted in the Mid-Atlantic States, pyrethroids provided 75-99% control of corn earworm in late 90s,

53-94% in 2002, and 27-82% in 2006-07. In effect, pyrethroids have lost about 1/3 of their effectiveness since 2002. Still, pyrethroid performance varies from year to year due to weather conditions affecting spray coverage and residue activity, level of pest pressure, and the proportion of resistant moths in the population. Keep in mind that most earworm moths immigrate in late summer into the Mid-Atlantic area from the south, so many are already resistant. To ensure economic control, growers have tightened spray schedules, increased application rates, and deployed rotations and mixtures of pyrethroids with carbamates.

New reduced risk insecticides with modes of action different from pyrethroids have recently come on the market but have not replaced the industry standards. Products such as Coragen (rynaxypyr), Radiant (spinetoram), Volium Xpress (chlorantraniliprole and lambda-cyhalothrin), and Belt (flubendiamide) have consistently performed better than pyrethroids used alone. However, they are generally more expensive, have label restrictions on amount and frequency of product applied per season, and not all are registered for use on sweet corn at this time. So check with your dealer and read labels carefully before use. The organic insecticide Entrust (spinosad) also can provide good control if frequent applications are timed properly during silking to maintain residual protection.

As an alternative option, Attribute® Insect Protected sweet corn expressing the Bacillus thuringiensis cry1Ab endotoxin is a more targeted and sustainable pest management tool for growers. Commercialized by Syngenta Seeds in 1998, adoption of Bt sweet corn has been steadily increasing, with the availability of more fresh market hybrids, which were planted on about 35,000 acres in 2009. For the 2010 season, the following Attribute® hybrids for fresh markets are available through several major seed dealers: four supersweets GSS0966 (yellow, PrimePlus type), BSS0977 (bicolor), BSS0982 (bicolor), and WSS0987 (white), and four TripleSweets® BC0805 (bicolor, Providence type), WH0809 (white, Avalon type), GH0851 (yellow), and BC0808 (bicolor). Syngenta continues to develop new Bt hybrids each year, and many are now available in 25K seed units for the smaller growers. Season-long insect protection afforded by these resistant hybrids eliminates whorl treatments for European corn borer and fall armyworm and reduces silk sprays for the ear-invading caterpillars by as much as 4 applications. Bt sweet corn also has no adverse effects on beneficial insects, whereas conventional insecticides significantly reduce natural enemy communities.

Does it pay to grow Bt sweet corn? Depending on the hybrid, seeds costs are $35-40 more per acre than non-Bt seed. So if you typically apply a whorl treatment and three or more silk applications, growing Bt sweet corn results in cost savings. Moreover, Bt sweet corn significantly reduces the time that growers spend in managing insect pests, as well as the exposure risks from handling and applying insecticides. These benefits are valued by many growers who are willing to pay more for the Bt technology.

Are supplemental insecticides required for Bt sweet corn? Though resistant hybrids provide excellent protection against the caterpillar complex, supplemental insecticide sprays may be needed to ensure fresh market ear quality. In the case of corn borers, control is 100%, so insecticide sprays are not needed if this insect is the only pest infesting your sweet corn. The Bt trait also provides enough suppression of fall armyworm infestations during whorl stages to eliminate pre-silk sprays in most situations. However, if corn earworm is the major ear-invading pest, supplemental sprays are needed during silking when moth activity is high. This situation occurs, usually from early August to mid September, when a greater portion of the eggs are laid on wilted or brown silk tissue within 14 days from harvest. Earworms hatching at this time have a better chance of surviving and invading the ear because older silk tissue and kernels express less active Bt protein and ear tips become more exposed. Under high earworm pressure, it is not uncommon to find 30-40% of the Bt ears infested with small to medium-sized worms (usually less ½ inch in length). Although these surviving larvae primarily cause minor tip injury, their presence and noticeable kernel injury may represent a quality problem for fresh market outlets. The timing of insecticide application in Bt sweet corn is different from that of non-Bt corn because most surviving larvae hatch and enter the ear after fresh silking. The first supplemental spray should be directed at the ear zone at full silk (usually 3-4 days later than the first silk spray timing for non-Bt corn). A second spray should be applied 3-4 days later if heavy moth activity continues, and sometimes a third treatment is necessary.

Are other insect pests of sweet corn affected by the Bt trait? As mentioned above, Bt sweet corn provides adequate suppression of whorl and tassel infestations of fall armyworms but these more tolerant larvae can damage husk leaves and enter the ear during silking. Because fall armyworms usually become an ear-invading problem later in the season, supplemental treatments recommended for corn earworm control this pest as well. Sap beetles and rootworm adults can also cause ear quality problems because the expressed Bt protein has no effect on these insects. Sap beetles are less likely to infest ears without worm damage; however, they can be primary invaders. Rootworm

adults can reduce ear quality by clipping silks, interfering with pollination, and causing incomplete kernel fill. One insecticide application timed when beetles are active on silks usually prevents these insects from causing economic ear damage, especially for hybrids with good ear tip coverage. This application closely coincides with the first supplemental spray to control earworms. Seed and seedling pests, such as cutworms, grubs, wireworms, flea beetles, maggots, and rootworms, are all unaffected by the Bt protein expressed in Attribute sweet corn, so these pests may need to be managed by other control tactics. Keep in mind that Bt sweet corn fields will not be insect free, so regular scouting for insects not controlled by the expressed protein is recommended.

Fusarium Wilt on Watermelon

Kate Everts, Extension Vegetable Plant Pathologist, UME

Watermelons, which are grown on over 2400 acres in Maryland, are subject to several serious diseases including Fusarium wilt. Production changes over the past decade have resulted in increasing levels of watermelon Fusarium wilt in the mid-Atlantic region. Initial symptoms of disease are the presence of wilted leaves that occur even when soil moisture is adequate. The plants may appear to recover in the evening through the next morning when transpiration is reduced. As the disease progresses, Fusarium wilt results in permanent wilting of one vine or the whole plant **Figure 1A & 1B**. A stem that is cut longitudinally will display recognizable symptoms of red to brown discoloration of the vascular system **Figure 2**.

Figure 1A. Single vine runner wilted mid-season.

Figure 1B. Wilted plants at harvest.

Figure 2. Vascular discoloration within the cut watermelon stem (Image from A. P. Keinath, Clemson Univ.).

The fungus that causes Fusarium wilt, *Fusarium oxysporum* f.sp. *niveum,* was successfully managed for many years through a combination of cultivar resistance in seeded cultivars, rotation, and fumigation. However, the shift to production of seedless cultivars and the loss of the use of methyl bromide as a fumigant have resulted in an increase in Fusarium wilt. (Our trials in 2002 and 2005 showed that commonly grown seedless cultivars were highly susceptible to Fusarium wilt.) Rotation alone is not an effective management practice because the pathogen can survive saprophytically - that is without causing disease - on the roots of non-hosts. In addition, research on *F.o. niveum* in production fields in Maryland and Delaware indicate that the pathogen population has shifted from race 1 to a more virulent type, race 2. This shift presents a significant problem for growers because even the previously grown resistant diploid cultivars never had resistance to *F. o. niveum* race 2.

Table 1. Performance of triploid (seedless) watermelon cultivars to Fusarium wilt in 2009.

Cultivar	Source	Wilt Incidence (%)[z]				Yield			
		7 July		21 July		Fruit no. per plot		t/ha	
Ruby	Siegers	36	b*	52	a	3.5	e	3.0	a
Indianna	Seedway	68	a	46	a	6.5	de	2.9	a
Melody	Seedway	29	bc	27	b	15.0	bcd	8.5	a
Majestic	Seminis	13	bc	16	bc	16.8	bc	14.5	a
Sugar Heart	Siegers	11	bc	14	bc	16.8	bc	25.0	a
ACX5727 FR	Abbott & Cobb	18	bc	13	bc	14.8	bcd	13.3	a
ACR6177TSS FR	Abbott & Cobb	5	c	9	bc	20.3	abc	21.7	a
Olympia	Seminis	7	c	9	bc	12.5	cde	12.2	a
ACX5117T FR	Abbott & Cobb	16	bc	7	c	23.3	ab	31.1	a
Sweet Delight	Seedway	7	c	7	c	15.0	bcd	18.7	a
Matrix	Seedway	29	bc	5	c	16.5	bc	26.1	a
ACX4674T FR	Abbott & Cobb	7	c	5	c	26.8	a	28.9	a
Apollo	Seminis	16	bc	5	c	16.8	bc	17.9	a
ACR6277TSS FR	Abbott & Cobb	7	c	4	c	22.3	ab	34.0	a
P>F		0.0012		0.0001		0.0012		0.0515	

* Percent of plants that were wilted or dead.

**Mean values in each column and year followed by the same letter are not significantly different at $P = 0.05$ based on Fisher's protected least significant different test.

There is good news, though. Many commercial watermelon breeding programs are working to develop seedless cultivars with resistance to the virulent races of *F. o. niveum* present here in the mid-Atlantic. A study we conducted at the University of Delaware's Research and Education Center in 2009 evaluated several seedless cultivars which had been reported to have resistance to race 1. Some cultivars performed well **Table 1** including Abbott & Cobb lines ACR6277TSS, ACX4674T, Seedway's Sweet Delight and Seminis' Olympia. We have confirmed that race 2 is present in the field, which may have caused the poor results we observed on other lines that also were reported to have some resistance to race 1. Through funding from the Delaware Department of Agriculture Specialty Crops Block Grant, the evaluations of seedless cultivars will be continued in 2010. Research that is being conducted at University of Maryland's Lower Eastern Shore Research and Education Center in Salisbury is also evaluating the use of fungicides and cover crops as an integrated management practice for Fusarium wilt of watermelon in an ongoing effort to expand grower's management options.

Thanks for partnering with University of Maryland Extension, and supporting our programs.

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